

communications channel 106, is the sum of the output of communications channel 106 $x(t)$ and an additive noise signal $w(t)$. The received data $y(t)$ 202 is processed by a differential amplifier 204, one or more receive filters 206 and an analog-to-digital converter 208 to produce a sampled signal $y(n)$, where n is the sample number.

CLAIMS IN "CLEAN FORM"

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- 1 2. (NEW) A method for processing data received from a communications channel
2 comprising the computer-implemented steps of:
3 receiving, from the communications channel, received data that is based upon both
4 modulated data and distortion introduced by the communications channel,
5 wherein the modulated data is the result of original data modulated onto one
6 or more carriers;
7 equalizing the received data using an equalizer to generate equalized data, wherein
8 the equalizer uses an algorithm with a set of one or more coefficients selected
9 to account for a frequency domain response of the equalizer; and
10 recovering an estimate of the original data by demodulating the equalized data.
 - 1 3. (NEW) The method as recited in Claim 2, wherein the set of one or more coefficients
2 is selected to reduce variations in the frequency domain response of the equalizer.
 - 1 4. (NEW) The method as recited in Claim 2, wherein the set of one or more coefficients
2 is further selected to reduce the distortion introduced by the communications channel.
 - 1 5. (NEW) The method as recited in Claim 2, wherein the received data was modulated
2 using a cyclic prefix and the set of one or more coefficients is selected to ensure that a

3 combined impulse response of the communications channel and the equalizer is less
4 than the cyclic prefix.

1 6. (NEW) The method as recited in Claim 2, wherein finite precision arithmetic is
2 employed in the equalizer to implement the algorithm and the set of one or more
3 coefficients is selected to compensate for round off errors attributable to the use of the
4 finite precision arithmetic in the equalizer.

1 7. (NEW) The method as recited in Claim 6, wherein the set of one or more coefficients
2 is determined based upon modeling noise attributable to the round off errors as a
3 white noise source at an output of the equalizer.

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1 8. (NEW) The method as recited in Claim 2, wherein the step of demodulating the
2 equalized data includes the use of finite precision arithmetic and the set of one or
3 more coefficients is selected to compensate for round off errors attributable to the use
4 of the finite precision arithmetic to demodulate the equalized data.

1 9. (NEW) The method as recited in Claim 8, wherein the step of demodulating the
2 equalized data includes the use of a fast fourier transfer algorithm and the set of one
3 or more coefficients is selected to compensate for round off errors attributable to the
4 use of the finite precision arithmetic to implement the fast fourier transfer algorithm.

1 10. (NEW) The method as recited in Claim 2, wherein the step of equalizing the received
2 data includes processing the received data using a finite impulse response (FIR) filter.

1 11. (NEW) The method as recited in Claim 10, wherein the received data is modulated
2 using discrete multitone modulation and a set of one or more (FIR) coefficients for
3 the finite impulse response filter is selected to maximize, in the equalizer, the
4 numbers of bits used to represent each discrete multitone symbol.

1 12. (NEW) The method as recited in Claim 2, wherein the method further comprises
2 processing the received data using an analog-to-digital converter and the set of one or
3 more coefficients is further selected to account for quantization noise in the analog-
4 to-digital converter.

1 13. (NEW) The method as recited in Claim 2, wherein the communications channel is a
2 twisted pair telephone line.

1 14. (NEW) A computer-readable medium carrying one or more sequences of one or more
2 instructions for processing data received from a communications channel, wherein the
3 processing of the one or more sequences of one or more instructions by one or more
4 processors cause the one or more processors to perform the steps of:

5 receiving, from the communications channel, received data that is based upon both

6 modulated data and distortion introduced by the communications channel,

7 wherein the modulated data is the result of original data modulated onto one

8 or more carriers;

9 equalizing the received data using an equalizer to generate equalized data, wherein

10 the equalizer uses an algorithm with a set of one or more coefficients selected

11 to account for a frequency domain response of the equalizer; and

12 recovering an estimate of the original data by demodulating the equalized data.

1 15. (NEW) The computer-readable medium as recited in Claim 14, wherein the set of one
2 or more coefficients is selected to reduce variations in the frequency domain response
3 of the equalizer.

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1 16. (NEW) The computer-readable medium as recited in Claim 14, wherein the set of one
2 or more coefficients is further selected to reduce the distortion introduced by the
3 communications channel.

1 17. (NEW) The computer-readable medium as recited in Claim 14, wherein the received
2 data was modulated using a cyclic prefix and the set of one or more coefficients is
3 selected to ensure that a combined impulse response of the communications channel
4 and the equalizer is less than the cyclic prefix.

1 18. (NEW) The computer-readable medium as recited in Claim 14, wherein finite
2 precision arithmetic is employed in the equalizer to implement the algorithm and the
3 set of one or more coefficients is selected to compensate for round off errors
4 attributable to the use of the finite precision arithmetic in the equalizer.

1 19. (NEW) The computer-readable medium as recited in Claim 18, wherein the set of one
2 or more coefficients is determined based upon modeling noise attributable to the
3 round off errors as a white noise source at an output of the equalizer.

1 20. (NEW) The computer-readable medium as recited in Claim 14, wherein the step of
2 demodulating the equalized data includes the use of finite precision arithmetic and the
3 set of one or more coefficients is selected to compensate for round off errors
4 attributable to the use of the finite precision arithmetic to demodulate the equalized
5 data.

1 21. (NEW) The computer-readable medium as recited in Claim 20, wherein the step of
2 demodulating the equalized data includes the use of a fast fourier transfer algorithm
3 and the set of one or more coefficients is selected to compensate for round off errors

4 attributable to the use of the finite precision arithmetic to implement the fast fourier
5 transfer algorithm.

1 22. (NEW) The computer-readable medium as recited in Claim 14, wherein the step of
2 equalizing the received data includes processing the received data using a finite
3 impulse response (FIR) filter.

1 23. (NEW) The computer-readable medium as recited in Claim 22, wherein the received
2 data is modulated using discrete multitone modulation and a set of one or more (FIR)
3 coefficients for the finite impulse response filter is selected to maximize, in the
4 equalizer, the numbers of bits used to represent each discrete multitone symbol.

1 24. (NEW) The computer-readable medium as recited in Claim 14, wherein the
2 computer-readable medium includes one or more additional instructions which, when
3 executed by the one or more processors, cause the one or more processors to process
4 the received data using an analog-to-digital converter and the set of one or more
5 coefficients is further selected to account for quantization noise in the analog-to-
6 digital converter.

1 25. (NEW) The computer-readable medium as recited in Claim 14, wherein the
2 communications channel is a twisted pair telephone line.

1 26. (NEW) An apparatus for processing data received from a communications channel
2 comprising:
3 an equalizer configured to equalize received data from the communications channel
4 and generate equalized data, wherein the received data is based upon both
5 modulated data and distortion introduced by the communications channel, and
6 the modulated data is the result of original data modulated onto one or more

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7 carriers, and wherein the equalizer is configured to use an algorithm with a set
8 of one or more coefficients selected to account for a frequency domain
9 response of the equalizer; and
10 a demodulator configured to generate an estimate of the original data by
11 demodulating the equalized data.

1 27. (NEW) The apparatus as recited in Claim 26, wherein the set of one or more
2 coefficients is selected to reduce variations in the frequency domain response of the
3 equalizer.

1 28. (NEW) The apparatus as recited in Claim 26, wherein the set of one or more
2 coefficients is further selected to reduce the distortion introduced by the
3 communications channel.

1 29. (NEW) The apparatus as recited in Claim 26, wherein the received data was
2 modulated using a cyclic prefix and the set of one or more coefficients is selected to
3 ensure that a combined impulse response of the communications channel and the
4 equalizer is less than the cyclic prefix.

1 30. (NEW) The apparatus as recited in Claim 26, wherein finite precision arithmetic is
2 employed in the equalizer to implement the algorithm and the set of one or more
3 coefficients is selected to compensate for round off errors attributable to the use of the
4 finite precision arithmetic in the equalizer.

1 31. (NEW) The apparatus as recited in Claim 30, wherein the set of one or more
2 coefficients is determined based upon modeling noise attributable to the round off
3 errors as a white noise source at an output of the equalizer.

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1 32. (NEW) The apparatus as recited in Claim 26, wherein the demodulator is configured
2 to process the equalized data using finite precision arithmetic and the set of one or
3 more coefficients is selected to compensate for round off errors attributable to the use
4 of the finite precision arithmetic to demodulate the equalized data.

1 33. (NEW) The apparatus as recited in Claim 32, wherein the demodulator is configured
2 to process the equalized data using a fast Fourier transfer algorithm and the set of one
3 or more coefficients is selected to compensate for round off errors attributable to the
4 use of the finite precision arithmetic to implement the fast Fourier transfer algorithm.

1 34. (NEW) The apparatus as recited in Claim 26, further comprising a finite impulse
2 response (FIR) filter configured to process the receive data.

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1 35. (NEW) The apparatus as recited in Claim 34, wherein the received data is modulated
2 using discrete multitone modulation and a set of one or more (FIR) coefficients for
3 the FIR filter is selected to maximize the number of bits used to represent each
4 discrete multitone symbol in the equalizer.

1 36. (NEW) The apparatus as recited in Claim 26, further comprising an analog-to-digital
2 converter configured to process the received data and the set of one or more
3 coefficients is further selected to account for quantization noise in the analog-to-
4 digital converter.

1 37. (NEW) The apparatus as recited in Claim 26, further comprising a coefficient
2 generator for generating the set of one or more coefficients.

1 38. (NEW) The apparatus as recited in Claim 26, wherein the communications channel is
2 one or more twisted pair telephone lines.

1 39. (NEW) A computer-readable medium carrying coefficient data that represents a set of
2 one or more coefficients that are selected to account for a frequency domain response
3 of an equalizer when the coefficients are used with an algorithm to equalize received
4 data from a communications channel, wherein the received data is based upon both
5 modulated data and distortion introduced by the communications channel and the
6 modulated data is the result of original data modulated onto one or more carriers.

1 40. (NEW) A method for generating coefficient data comprising the computer-
2 implemented step of generating coefficient data that represents a set of one or more
3 coefficients that are selected to account for a frequency domain response of an
4 equalizer when the coefficients are used with an algorithm to equalize received data
5 from a communications channel, wherein the received data is based upon both
6 modulated data and distortion introduced by the communications channel and the
7 modulated data is the result of original data modulated onto one or more carriers.

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1 41. (NEW) An apparatus for generating coefficient data comprising:
2 a storage medium for storing the coefficient data; and
3 a coefficient generator configured to generate the coefficient data, wherein the
4 coefficient data represents a set of one or more coefficients that are selected to
5 account for a frequency domain response of an equalizer when the coefficients
6 are used with an algorithm to equalize received data from a communications
7 channel, wherein the received data is based upon both modulated data and
8 distortion introduced by the communications channel and the modulated data
9 is the result of original data modulated onto one or more carriers.